

CLAIMS

What is claimed is:

1. A routing device comprising:
a plurality of ports that input and output network traffic that is separated into at least one channel per port;
a plurality of network interfaces, each comprising at least one channel; and
a plurality of routers,
wherein any one of the plurality of network interfaces is assigned to any one of the plurality of individual routers.
2. The routing device of claim 1, wherein each of the plurality of routers has associated therewith an independent routing instantiation relating to its corresponding network interface.
3. The routing device of claim 1, wherein a routing policy implemented by each of the plurality of routers identifies data packets traversing each network interface with their corresponding router.
4. The routing device of claim 1, wherein each network interface and its corresponding router is assigned to a particular user.
5. The routing device of claim 4, wherein a maximum amount of network traffic is assigned to each network interface and its corresponding router, in accordance with bandwidth requirements of the corresponding user.
6. The routing device of claim 1, wherein each router comprises a software construct that resides on a router card within the routing device.
7. The routing device of claim 6, wherein each router card comprises a microprocessor and an associated memory.

8. The routing device of claim 7, further comprising a plurality of router cards, each router card comprising at least one router.
9. The routing device of claim 8, wherein each of the plurality of router cards is hot-swappable.
10. The routing device of claim 8, wherein a primary router on a first router card is associated with a secondary router on a second router card, such that the secondary router assumes the function of the first router upon a failure of the first router or a designation by an operator of the routing device.
11. The routing device of claim 8, further comprising:
a plurality of line cards, each including storage for on which routing and forwarding information for an associated router.
12. The routing device of claim 11, wherein the plurality of line cards include a plurality of independent forwarding tables that are in a one-to-one correspondence with the plurality of routers, and include information to identify network traffic for forwarding through the routing device.
13. The routing device of claim 11, further comprising:
a management card for managing the routing device that is connected to the router cards and the line cards via a first medium.
14. The routing device of claim 13, wherein the first medium comprises a first fabric housed on a first set of fabric cards.
15. The routing device of claim 14, further comprising:
a second medium, comprising a second fabric, that connects the line cards, wherein the second fabric comprises a high-speed fabric operable at approximately line rate.
16. The routing device of claim 1, wherein the plurality of routing devices are logically and physically independent of one another.

17. The routing device of claim 1, wherein the plurality of individual routers are contained within a single chassis.
18. An apparatus for routing data in accordance with routing schemes for a plurality of customers, the apparatus comprising:
- a plurality of input/output modules, each module including at least one port including at least one data channel,
 - a plurality of independent routers each having associated therewith a plurality of data channels; and
 - a control fabric coupled to said input/output modules;
- wherein one of said plurality of input/output modules includes a plurality of channels, a first subset of which are associated with a first one of said plurality of independent routers and a second subset of which are associated with a second one of said plurality of independent routers.
19. The apparatus of claim 18, wherein each of the independent routers is a software construct residing on at least one router card.
20. The apparatus of claim 19, further comprising:
- a plurality of line cards that are associated with the independent routers and that include storage for routing and forwarding information for their respective routers; and
 - a data fabric connecting the line cards.
21. The apparatus of claim 20, further comprising:
- a management card for managing the apparatus that is connected to the router cards and the line cards via the control fabric.
22. The apparatus of claim 21, wherein each independent router is configured according to requirements of a customer associated therewith.
23. An apparatus for routing data in accordance with routing schemes for a plurality of customers, the apparatus comprising:

a plurality of input/output modules, each module including at least one port, including at least one data channel;

a plurality of routing modules, wherein one of said plurality of routing modules includes a plurality of routing tables wherein said plurality of routing tables define routing requirements for a plurality of routers; and

a router fabric coupled between said plurality of input/output modules and said plurality of routing modules.

24. The apparatus of claim 23, wherein each of the routing modules includes software objects that are individually assigned to one of the plurality of customers, wherein the software object is provisioned to route data in accordance with respective data requirements of the plurality of customers.

25. The apparatus of claim 24, further comprising:

a plurality of switching modules, each including storage for routing and forwarding information that corresponds to one of the routing modules.

26. The apparatus of claim 25, wherein the switching modules comprise software objects that are attached to the routing modules via the router fabric.

27. The apparatus of claim 25, further comprising:

a switch fabric that connects the switch modules and forwards the data with previously-determined routing characteristics at approximately line rate.

28. The apparatus of claim 25, further comprising:

a management module through which an operator of the apparatus or one of the customers provisions and assigns the resources of the apparatus, including the capacity and number of routing and switching modules, to a customer.

29. A method for managing data flow in a data routing environment, the method comprising:

receiving first data packets on a first channel of an input/output module;

querying a first router for routing information for the received first data packets;

routing said first data packets through a control fabric, based on a response to the querying of the first router;

receiving second data packets on a second channel of the input/output module;

querying a second router for routing information for the received second data packets; and

routing said second data packets through the control fabric, based on a response to the querying of the second router.

30. The method of claim 29, wherein said receiving first data packets on a first channel of an input/output module further comprises:

determining whether routing characteristics for said first data packets have been previously assigned, and, if so, forwarding the first data packets accordingly, and further wherein said receiving second data packets on a second channel of the input/output module further comprises:

determining whether routing characteristics for said second data packets have been previously assigned, and, if so, forwarding the second data packets accordingly.

31. The method of claim 30, wherein said forwarding the first and second data packets occurs over a data plane, and further wherein said routing said first and second data packets occurs over a control plane.

32. The method of claim 29, further comprising:

configuring the resources of the first and second router in accordance with data requirements of a first and second customer, respectively.

33. A method of routing and forwarding network traffic, comprising:

defining a network interface by assigning at least one channel on an input/output port to the network interface;

assigning the network interface to any one of a plurality of routers;

assigning the interface and the router to a user;

inputting the network traffic through the interface; and

routing and forwarding the network traffic using the assigned router.

34. The method of claim 33, wherein said routing and forwarding the network traffic using the assigned router further comprises:

 caching routing and forwarding information of the router on a line card that forwards the network traffic accordingly, via a data fabric.

35. The method of claim 33, wherein said assigning the interface and the router to a customer further comprises:

 provisioning a bandwidth of the network interface and the resources of the router according to a customer's requirements.

36. The method of claim 35, wherein said routing and forwarding the network traffic using the assigned router further comprises:

 routing the network traffic via a control fabric that connects the line cards and the routers.

37. The method of claim 36, wherein said assigning the interface and the router to a customer further comprises:

 accessing a management control card that is connected to the routers and to the line cards via the control fabric.